



Climate governance through partnerships: A study of 150 urban initiatives in China

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ABSTRACT

Partnerships emerge as part of an environmental governance paradigm shift towards less hierarchical, more collaborative, and non-regulative steering arrangements. This paper examines the prevalence of partnerships in environmental governance on an urban level in a semi-authoritarian setting, by exploring climate initiatives in cities in China. The paper presents exploratory qualitative analysis of governance in urban China through analysis of a database of 150 climate initiatives in 15 cities, which are seen at the forefront of climate protection. The analysis suggests that climate partnerships are used as a governance strategy in China. Moreover, partnerships perform a range of essential governance functions, from rule-setting and provision of public infrastructure and services, to supporting technology development and low carbon demonstration projects. The results indicate that partnerships can facilitate local climate action by creating access to resources, such as information, technology, and funding, as well as contribute to introduction of emission reduction technology and new policy approaches. However, the inclusion of non-state actors in the formulation and delivery of climate mitigation projects redefines the lines of authority over public issues. This draws attention to two key governance challenges in the context of a comparatively state-controlled, top-down political system: skewed participation and lack of deliberative opportunities.

1. Introduction

These are tumultuous times in international climate change politics. The Trump administration has withdrawn the commitment of the United States to the carbon emission reduction agreement signed at the Paris Conference in 2015 (Hunt, 2017). Meanwhile, China is re-inventing its position on this global issue – from the nation that some described as “wrecking” the Copenhagen Conference of Parties (COP) in 2009 (Lynas, 2009), to a country donning the mantle of international climate mitigation leadership (Emmott & Bartunek, 2017; Hilton, 2016). While global political maneuvers continue, they no longer dominate the stage of global climate mitigation action. Policymakers and scholars have instead directed their attention towards the multiple responses produced by sub-national authorities, transnational organizations, private alliances and firms, grassroots movements, and individuals in their quests to address the climate change challenge (Hoffmann, 2011; Bulkeley et al., 2014).

New possibilities for action have emerged since the turn to informal, experimental and voluntary approaches to climate change governance, and through the formation of networks of actors that operate across

geographical scales and administrative borders (Bulkeley et al., 2014; Chan et al., 2015; Hoffmann, 2011; Bulkeley & Newell, 2015; Okereke et al., 2009). Through transnational networks, sub-national government authorities and other non-state actors have gained prominent roles in climate action, and have created opportunities to shape international policy discourses and mobilize resources across political levels and boundaries (Kern & Bulkeley, 2009; Toly, 2008).

Partnerships are a governance strategy associated with networks. Sustainability partnerships are “collaborative arrangements in which actors from two or more spheres of society (state, market and civil society) are involved in a non-hierarchical process through which these actors strive for a sustainability goal” (Glasbergen et al., 2007, p. 2). Sustainability governance through partnerships is a pervasive phenomenon (Backstrand et al., 2010; Bulkeley & Castán Broto, 2012; Castán Broto & Bulkeley, 2013; Glasbergen et al., 2007; Huijstee et al., 2007; Pattberg et al., 2012). Yet, there is a need to understand how governance through partnerships influences the delivery of sub-national action for climate change. What kind of partnerships govern climate change? How, specifically, do partnerships contribute to local climate mitigation action?

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We examine this question in the context of climate mitigation action in China - a nation that has adopted ambitious low carbon development targets. China's Intended Nationally Determined Contributions (INDC) aim for carbon dioxide emissions to peak by 2030, carbon dioxide emission intensity to be lowered by 60% to 65% from the level in 2005, and the share of non-fossil fuels in the energy mix to increase to 20% (NDRC, 2015). These goals must to a large extent be implemented locally, especially on a municipal level. By 2030, China's urban population is expected to increase to around one billion, making up 70% of the national total (World Bank, 2014). Urban regions in China also account for a large share of energy use and energy-related carbon dioxide emissions (Baeumler et al., 2012; Dhakal et al., 2011; Oshita et al., 2015). By introducing a low carbon pilot province and cities program (NDRC, 2013), the central government has placed municipal and provincial authorities at the forefront of experimentation in climate policy.

At the same time, China's new environmental governance arrangements are shifting roles and responsibilities of public and non-state actors (Carter & Mol, 2013; Mol & Carter, 2006; Mol, 2009). Tangible changes include:

- 1) Increasing responsibility of local authorities for environmental protection and climate mitigation (Lo & Tang, 2006; Qi et al., 2008);
- 2) Increasing non-state actor participation in environmental policy (Francesch-Huidobro et al., 2012; Mai & Francesch-Huidobro & 2015; Meidan et al., 2009; Tsang & Kolk, 2010);
- 3) Contribution of the private sector to sustainable infrastructure (Tian, 2015; Zhong et al., 2008); and
- 4) Rising visibility of civil society in environmental affairs (Ho, 2007; Tang & Zhan, 2008; Zhan & Tang, 2013).

Partnerships may be an important part of these transformations, but their role has not previously been studied in detail. Thus, this paper analyses how urban climate partnerships emerge at the local scale in China, how they facilitate local climate action, and what trends in participation they foster.

The paper is organized as follows. Section 2 provides an overview of the literature on climate governance, with a focus on governance through partnerships. Section 3 discusses trends in climate governance in China, highlighting the emergence of cross-sector interaction and governance networks. Section 4 describes the methodology of the study. Section 5 presents the results, demonstrating a diversity of partnership constellations employed in urban climate governance. Section 6 discusses theoretical implications of the findings, in particular how partnerships as a collaborative governance mode can be understood in China's political system.

2. Climate governance through networks and partnerships

The concept of governance gained traction as nation-states were deemed to lose influence over interconnected, fragmented and globalized public policy issues (Rhodes, 1996; Rosenau, 1995). In this setting, governments sought to increase authority through sharing it horizontally (with non-governmental organizations) and vertically (which sub-national governmental or intergovernmental institutions) (Hooghe & Marks, 2001; Pierre, 2000; Pierre & Peters, 2000). Theories of governance networks provided workable alternatives to the failure of traditional hierarchal or market-based approaches to public issues in a dynamic and complex society (Kickert et al., 1997). This literature explains how public actors achieve collective goals through dialogue, negotiation, and collaboration with a diversity of inter-dependent organizations beyond the traditional public sphere (Sorensen & Torfing, 2007; Torfing et al., 2012).

In environmental politics, the rise of partnerships emerged as part of a governance paradigm based on less hierarchical and more collaborative, deliberative, and inclusive steering arrangements (Backstrand et al., 2010). An emphasis on deliberation has been central to

environmental policy since at least the 1992 United Nations (UN) Conference on Environment and Development (Earth Summit) (Glasbergen et al., 2007), and this emphasis is reproduced in the Sustainable Development Goals (UNSD, 2015). SDG17 ("Revitalize the global partnership for sustainable development") represents a firm commitment to partnerships as a strategy to implement sustainability action. Nevertheless, this conceptualization remains centered on traditional forms of governance based upon formal institutions and top-down control. A realization since the debacle in the 2009 Conference of Parties in Copenhagen (see Hoffman, 2011) is that partnerships create opportunities for performing agency and authority outside formal institutions. Glasbergen et al., 2007 argues that governance through partnerships represents a fundamental shift towards pluralistic steering approaches where businesses and civil society not only are part of realizing predefined aims, but in formulating development goals. He argues that governance through partnerships is achieved through self-organizing capacities of societal actors and their collective commitment to resolving sustainability challenges. Sustainability partnerships exist in various forms, involving collaboration between companies, public authorities, NGOs, and research organizations, operating on a regional, national and global level (Huijstee et al., 2007). Sustainability partnerships also perform a variety of governance functions, ranging from rule making and standard setting to information dissemination, technology transfer and capacity building (Pattberg et al., 2012).

Climate mitigation presents new policy challenges and efforts to govern the climate often involve pursuit of material and policy innovation. Nation states have re-emerged as key actors in climate governance through a surge of activity directed towards developing novel climate policy instruments (Jordan & Huitema, 2014). Urban climate change governance is characterized by innovative measures and experimental processes, which open up new political spaces for intervention at the local level (Bulkeley & Castán Broto, 2012; Castán Broto & Bulkeley, 2013). Partnerships create opportunities for climate policy diffusion, as collaboration and cross-sector interaction can facilitate learning and adoption of new ideas and approaches (Bauer & Steurer, 2014).

The pursuit of collaborative and participatory forms of environmental governance generates a normative expectation that this will result in more democratic steering arrangements. Partnerships can accrue benefits such as consultation and dialogue, possibility to include otherwise marginalized voices, and filling participatory deficits (Glasbergen, 2011). For example, forming partnerships with communities can empower socially excluded groups and highlight issues of justice, while aligning agendas with local development priorities (Castán Broto et al., 2015a; Castán Broto et al., 2015b). However, such positive outcomes are not guaranteed (Backstrand et al., 2010). The transfer of influence over public issues to non-state actors can also be problematic from the perspective of democratic performance (Bogason & Musso, 2006; Pierre & Peters, 2010; Sorensen, 2002). For partnerships to meet criteria of legitimacy and accountability, they depend on achieving transparency and equal access to participation (Backstrand, 2008; Benner et al., 2004). For example, partnerships resulting from the World Summit on Sustainable Development (WSSD) displayed higher participation of actors from the global North and traditional actors, such as international institutions (Andonova & Levy, 2003; Pattberg & Strippel, 2008; see also Bitzer et al., 2008; Clapp, 1998; Dingwerth, 2008). In partnerships formed through transnational climate networks, government-led and private-private partnerships exhibit accountability deficits (Backstrand, 2008). Forsyth (2005) has argued that dominant players such as international institutions or large firms co-opt and exclude socially marginalized groups from partnerships. The benefits of partnerships can therefore not be taken for granted, either in terms of effectiveness in climate change action or increasing the room for social deliberation and participation.

3. Current trends in climate governance in China

Mol and Carter (2006) argue that China's environmental state, previously characterized by state-centric approaches and top-down lines of control, is shifting towards new governance strategies that is part of a transition to a "modern environmental state". This change is visible through a number of trends.

First, China's central government encourages non-state actor involvement in environmental protection and climate change mitigation action in key policy documents. The recently revised Environmental Protection Law points to the importance of public participation by highlighting the role of society in monitoring environmental pollution, disseminating information, and taking legal action against environmental offenders (NPC, 2015). China's National Climate Change Program aims to "widen the channels" for public participation and encourages enterprises to contribute to climate change mitigation (NDRC, IV, 2007). China's INDC calls for exploration of diversified paths of low carbon growth, which involves enhancing the responsibility of enterprises and introducing a stronger role for the public and media in supervising and participating in climate mitigation action (NDRC, p.15, 2015).

Second, the central government is also creating new roles in environmental protection and climate mitigation for authorities at a provincial and municipal level. As part of a long-term process of decentralization, the central leadership has increased the political and economic autonomy of lower level government authorities (Cai & Treisman, 2007; Liu & Salzberg, 2012). Today, municipal governments shoulder a broad range of responsibilities, including the formulation of economic development strategies, provision of public services and infrastructure, and spatial planning (Saich, 2008). Local Environmental Protection Bureaus (EPBs) have gained independence in determining priorities and financing arrangements, while being held to stricter performance standards (Lo & Tang, 2006). Since the NDRC's adoption of a National Climate Change Programme in 2007, local governments are expected to set up climate change leadership groups and adopt climate action plans. Local impacts of climate change and rising knowledge of the issue at the same time contribute to engagement of municipal authorities in independent climate action (Qi et al., 2008). At the same time, the central government continues to sets the overarching direction of China's climate agendas (Li & Wang, 2012; Price et al., 2011). Decentralization involves a delicate balance between maintaining top-down control and making room for local interests. The degree of autonomy depends on how the central government chooses to exercise continued control, and on how local actors navigate the expanding room for maneuver (Chung, 2000; Chung, 2016; Tsui & Wang, 2008).

The concept of "fragmented authoritarianism" describes how bureaucratic units have gained influence over political decisions in China, resulting in negotiation and bargaining within the political system (Lieberthal, 1992). Dumbaugh and Martin (2011) observe that political power in contemporary China is diffuse, complex and competitive. A third key change in China's environmental governance is an increasing involvement of non-public actors in environmental policy processes. Corporations (in particular large SOEs), parastatal think tanks and research organizations exercise significant influence over policy development (Francesch-Huidobro & Mai, 2012; Meidan et al., 2009; Tsang & Kolk, 2010; Wu, 2003). Although the central government limits social mobilization, environmental groups have become more visible and organized in recent years, increasing their capacity to influence political priorities (Ho, 2007; Tang & Zhan, 2008; Zhan & Tang, 2013). Along with rising visibility and severity of environmental deterioration, concern with environmental issues pervades media, online forums, and public demonstrations (Duggan, 2013; Lo & Leung, 2000; Zhang, 2014).

The operations of partnerships provide an insight into how climate change governance is accomplished. Until now, sustainability governance through partnerships has received limited attention in research on

environmental issues in China; however, there is evidence that cross-sector collaboration and network formation play an important role in environmental protection and climate mitigation. For example, the central government sees Public-Private Partnerships (PPPs) as a tool to diversify financing arrangements into sustainable infrastructure (Zhong et al., 2008; Xinhua, 2016). In the nongovernmental space, networks are forming between NGOs, media, lawyers, student groups, and researchers to advance shared goals (Lu, 2007). Chinese green NGOs are building connections with their foreign counterparts and increasing their participation in transnational networks (Schroeder, 2008). In a comprehensive study of the role of governance networks in urban climate mitigation, Mai and Francesch-Huidobro (2015) demonstrate that interaction among a plurality of state and non-state actors facilitates action by allowing knowledge transfers, resource mobilization, innovation diffusion, policy mainstreaming, and awareness raising. They argue that the emergence of governance networks in urban sustainability efforts in China is a grossly overlooked topic, pointing to the need for further studies using this perspective (Mai and Francesch-Huidobro, 2015, p.29). This paper presents the first systematic study of partnerships for climate change action in the Chinese city, to document broad changes in environmental governance and how they are changing the possibilities of action on the ground.

4. Materials and methods

This study draws inspiration from previous research using qualitative databases to study governance arrangements in transnational networks and sustainability partnerships (Pattberg et al., 2012; Bulkeley et al., 2012; Castán Broto & Bulkeley, 2013). The use of qualitative databases allows for exploration of activities that extend beyond single case studies, thus allowing systematic insights into governance patterns and trends (Pattberg et al., 2012). The approach involves compiling a large set of records containing information about a set of predefined dimensions. For this study, we created a database of 150 climate initiatives from fifteen cities in China.

4.1. City selection

We selected fifteen cities recognized for having a working program for climate action, and where cross-sector cooperation is likely to emerge. Such a sample represents the range of urban areas in China with an active engagement in climate issues, rather than all of urban China. Thus, governance patterns revealed by the analysis of this study do not necessarily reflect processes in cities where, despite having local environmental policies, climate action is not an explicit discourse informing local climate action. Nonetheless, the results may be indicative of emerging governance trends associated with the transition towards diversified environmental policy arrangements, which may eventually be expressed more widely across the country.

To reflect upon broader changes in national policy, we selected twelve cities from China's low carbon pilot province and cities program. The NDRC launched this program in 2010 to support low carbon development solutions that may be up-scaled in other cities (NDRC, 2013). We selected seven cities from the first pilot batch (Baoding, Chongqing, Hangzhou, Guiyang, Shenzhen, Tianjin, and Xiamen) and five cities from the second pilot batch, added to the program in 2012 (Beijing, Guangzhou, Kunming, Shanghai, and Qingdao). Finally, we included three cities not included in the pilot program, but which have obtained external recognition as forerunners in climate action (Rizhao, Shenyang and Wuxi). Rizhao received UN-HABITAT's award for green planning in 2009 and the World Clean Energy Award for popularization of renewable energy sources in 2007. Wuxi is engaged in the international Low Carbon Future Cities (LCFC) project and is a center for clean-tech production. Shenyang is a member of ICLEI and has adopted a low carbon development plan.

The selection of cities displays variation in socioeconomic

Table 1
List of cities selected for comparative analysis.

City	Province	Population (2015 estimate, million) ^a	GDP/capita (2015, billion CNY) ^b
Shanghai	Shanghai	24	103 000
Beijing	Beijing	20	107 000
Chongqing	Chongqing	13	53 000
Guangzhou	Guangdong	12	138 000
Shenzhen	Guangdong	11	162 000
Tianjin	Tianjin	11	109 000
Hangzhou	Zhejiang	6	113 000
Shenyang	Liaoning	6	88 000
Qingdao	Shandong	5	103 000
Xiamen	Fujian	4	91 000
Kunming	Yunnan	4	60 000
Wuxi	Jiangsu	3	131 000
Guiyang	Guizhou	3	63 000
Rizhao	Shandong	1	58 000
Baoding	Hebei	1	30 000

^a (UNDESA, 2014).

^b (China Online, 2016) China Online compiles data from national and local China Statistical Yearbooks and official news sources.

conditions and geographical location (Table 1 and Fig. 1). As illustrated by Table 1, the selection includes megacities, as well as smaller urban areas. The selection ranges from cities with high income (annual per capita of over 100,000 CNY) to medium income levels (annual per capita income of around 30,000 to 50,000 CNY).

4.2. Selection of initiatives

We defined a climate initiative as an action with an explicit goal of energy conservation, increased use of renewables, enhanced carbon sinks, or carbon fossil management, following the categories of climate action proposed by Socolow et al. (2004). An initiative was understood

to represent a concrete action, or a set of actions, with evidence of implementation. For example, we did not include climate mitigation plans or sustainability agendas that specify broad development agendas or future intended action; however, we did include low carbon transport plans that involved a set of specific actions happening on the ground.

We selected ten climate change mitigation initiatives from each city. The objective of focusing on an equal number in each city was to represent both geographical and sectoral variation in the sample while representing governance trends common across the cities. We were mindful of the risk of overrepresentation of cities where initiatives concentrate due to their role in international resource and governance networks. An initial search suggested that ten was an appropriate number of initiatives across the cities: all cities had at least ten initiatives that met the definition above, and this was a sufficiently big number to include initiatives from each sector in every city.

The search for initiatives for the database consisted of two steps. The first step was a systematic search of municipality websites, municipal or provincial news websites, websites of local companies, research organizations and civil society, and news and reports from international organizations and media, to identify the range of climate mitigation activities carried out in the selected cities. The second step was to select a sample of ten for inclusion in the database, focusing on prioritizing climate change and low carbon rationales, and meeting the criteria explained above. As we compiled the full selection, we revised the sample to ensure it represented initiatives led by diverse actors in each city and included a mixture of both typical (e.g. energy efficiency) and innovative projects (e.g. residential solar energy).

4.3. Database design

Each database record contains the following information: (1) year of launch; (2) sector; (3) type of organization leading the initiative; (4) cross-sector cooperation involved; (5) governance functions performed



Fig. 1. Geographical location of cities included in the study.

Table 2
Sector of selected climate initiatives.

Sector	Number of initiatives
Energy	35
Industry	32
Land Use	29
Construction	24
Transport	20
Waste	10
TOTAL	150

by the initiative, and (6) new technologies and policy or planning practices. The earliest project was launched in 1998 (a waste-to-energy plant in Hangzhou) and the latest in 2015 (a biomass power plant in Hangzhou and a low carbon park in Baoding). We selected initiatives from six sectors: industry, energy, construction, transport, land use (including forestry), and waste management. These are the sectors of climate interventions identified by the IPCC et al., 2014, minus agriculture, as we did not find any initiatives in this sector. As illustrated by Table 2, the largest number of initiatives in the sample were carried out in the energy and industrial sectors, and the smallest number in the waste sector. The larger number of initiatives chosen from the energy, industry and land-use sectors reflects that projects concentrate in these policy domains. For example, the distribution captures efforts to decarbonize China's energy supply and shift industrial activities towards low-carbon practices.

For each record, we listed the type of organization leading the initiative as follows: city authority, company, local academia/NGO, national or provincial authority, international/foreign organization, and public-private partnership (PPP). Cross-sector cooperation reflected all actors cooperating with the leading actor. The most common actor leading initiatives was municipal authorities (Table 3). Companies included state-owned enterprises (SOEs) (58%), private companies (36%), and public-private firms (6%). The sample also included one university-led initiative, one initiative led by an organization listed as an NGO, and nine initiatives led by research institutes or think tanks. Foreign or international organizations included foreign firms, international institutions, foreign authorities, and bilateral partners.

Following the literature on sustainability and climate partnerships we identified the following governance functions: agenda setting, advocacy, rule-making, standard setting, raising awareness, dissemination of information, knowledge production, implementation, service provision, capacity building, technology transfers, and developing sustainable products (Andonova et al., 2009; Bulkeley et al., 2012; Glasbergen et al., 2007; Huijstee et al., 2007; Pattberg et al., 2012). These categories were narrowed down to best-fit governance functions observed in partnerships in the database. The final five categories are defined and explained in Table 4.

To investigate if and how partnerships contribute to the introduction of new technology or policy approaches, we listed any “new” emission reduction technology and policy or planning practice. Relying on Bauer and Steurer's (2014, p.821) study on how climate partnerships contribute to policy innovation, we defined new policy as instruments

Table 3
Actor type leading selected climate initiatives.

Actor type	Number of initiatives
City authority	77
Company	53
Local Academia/NGO	11
Foreign/International organization	5
National or provincial authority	2
PPP	2
TOTAL	150

not previously applied in a sector, region, or local authority, and changes in existing instruments. We adopted a similar understanding of technology, which was defined as new when reported for the first time in the corresponding city. To evaluate this, we cross-checked the database information with reports and previous research on adoption of clean energy in cities in China.

4.4. Data analysis

A descriptive analysis of the database revealed trends regarding the type of initiatives that emerge in different sectors and are led by different actor constellations. We used the database as a tool to identify the range of partnership forms, functions and types of actor participation that are visible in urban climate initiatives. Following this step, we searched for evidence of introduction of emission reduction technology or new policy approaches and sought to identify partnership interactions that involved either deliberation or inclusion of particularistic interests. We searched for evidence of inclusion of a broad range of social actors and various interests and debates, which would indicate that partnerships open up for dialogue, participation, and amelioration of democracy deficits (Glasbergen, 2011). We also searched for indication of biases in participation, for example through overrepresentation of private interests or manipulation by local governments, which might indicate skewed influence over decision-making (Backstrand, 2008; Forsyth, 2005).

Next, we revised the database and examined emerging patterns. To find associations between actor constellations and specific governance trends, we created cross-tabulations between selected variables (actor leading initiatives, collaborating partners, sector, governance function, and introduction of technology or policy) and tested if there were any correlations between variables by performing Chi-Square tests. To present the results, we selected examples that illustrated partnership constellations, functions and actor roles.

4.5. Evaluating the results with local actors

Ten interviews were carried out in Beijing and Shandong Province between March and July 2016. The respondents included government authorities, companies, academic institutes, industrial alliances, and NGOs. The questions aimed at finding information about roles of actors in partnerships and the nature and function of cross-sector collaboration. We also reanalyzed transcripts from ten previously completed interviews carried out in Beijing between January and May 2013. The earlier set of interviewees included government agencies, companies, research institutes and environmental organizations evaluating or participating in climate mitigation dynamics on an urban level in China. Together they helped to evaluate the fit of our analysis to stakeholders' perceptions of climate change governance in China and clarify mechanisms suggested by cases in the database.

5. Results

The empirical evidence of this study suggests that partnerships are a governance strategy in urban climate mitigation action in China. Moreover, climate partnership arrangements exist in a range of forms, perform multiple functions, and support the introduction of new emission reduction policy and technology.

5.1. Partnership form

As shown in Table 5, almost half of the selected initiatives (72 out of 150) involved collaboration between actors. This share is similar to the frequency of partnerships found in research on climate initiatives in cities across the world (Castán Broto & Bulkeley, 2013). The result rules out the hypothesis that a dominant top-down model of environmental policy-making in China is preventing the formation of partnerships,

Table 4
Definition of governance function applied to selected climate initiatives.

Governance function	Definition
Information dissemination/demonstration	Spreading awareness of climate change through campaigns, exhibitions and museums. Showcasing solutions through demonstration projects, including low-carbon cities, districts, and buildings.
Rule-setting	Local adoption of formal rules or regulations, including policy targets, regulations, and spatial plans.
Service provision	Provision of public service and public infrastructure, in the transport, waste management, and energy sectors.
Technology development	Development of emission reduction technology through research projects and establishment of low carbon research centers.
Technology transfer	Transfer of emission reduction technology that results in first-time adoption in the selected city.

Table 5
Form of collaboration in selected climate initiatives.

Partnership/No partnership	Leading actor	Number of initiatives
Partnership	City	30
	Company	36
	Other	6
TOTAL		72
Single actor	City	59
	Company	17
	Other	2
TOTAL		78

although the political context may have a direct influence on the type of collaboration that emerges within this particular system.

Out of the initiatives involving multiple actors, the majority (36 initiatives) were led by companies. In many of these initiatives, Chinese firms imported emission reduction equipment from foreign companies. While some of the company-led projects involved limited collaboration, others involved a large number of actors and complex forms of interaction. In particular, this included demonstration projects, such as eco-cities and low carbon districts, where one or several foreign organizations (predominantly foreign firms, research institutes, or development banks) participated as advisors or project designers.

Of the 30 partnerships led by local governments, the most common constellation was partnerships with international organizations. In fact, partnerships with companies, local governments, or academic institutes seem to be the chief means for international organizations to intervene in climate governance in urban China. In total, 30% of the partnership initiatives involved international organizations. In the majority of these, the foreign partner provided technical advice, usually in low carbon demonstration or technology development projects. Such partnerships had the form of traditional development assistance projects, joint ventures (JVs), loosely structured dialogues or co-managed projects. Municipalities also frequently formed partnerships with companies. In most of these projects, technology, infrastructure or funding was delivered by a company to realize project implementation. These projects had the form of JVs, build-operate-transfer projects (BOTs), and collaborative arrangements to mobilize funding.

Actors also operate independently to deliver climate action. However, this sample suggests that climate initiatives led by a single actor tend to reproduce known examples of climate action and be less innovative than partnerships. In this sample, municipal authorities led 59 out of 78 initiatives managed by a single actor. Many of these initiatives had a regulatory or administrative nature (there was a correlation between initiatives led by municipal authorities and measures in the land-use sector, where administrative strategies like zoning plans and quotas for green space are common).¹ Further, the majority of these initiatives were similar to central government policies, such as guidelines for enforcement of central energy efficiency targets.

The other group of actors that often took independent climate action

was companies. Companies independently led 17 initiatives. The majority of these projects were sizeable renewable energy infrastructure projects or industrial energy efficiency retrofits (there was a correlation between initiatives led by companies and measures in the waste sector, where substantial infrastructure investments were most common).² Nearly all independent company-led initiatives were led by large SOEs with significant financial and technical capacity and ability to deliver projects without external collaboration.

5.2. Partnership function

The partnerships in this sample performed a range of governance functions, out of which the most common was information dissemination and demonstration (Fig. 2). Our results are consistent with previous research that highlights information dissemination and knowledge sharing as important partnership functions (Pattberg et al., 2012; Bulkeley et al., 2012). Partnerships are often associated with “soft” governance strategies rather than formulation of binding regulation and targets, which is in line with the lower number of rule-setting partnerships.

Information dissemination and demonstration

The 22 partnerships with the function of demonstration and information dissemination included eco-cities and low carbon districts, landscaping projects, and construction schemes. Eleven initiatives were led by municipal authorities, with foreign organizations and/or research institutes providing advice related to technology, design, or planning. Most of these were eco-city projects, which in several cases were operated through complex ownership structures. For example, the Sino-Singaporean eco-city in Tianjin is managed by a joint working committee representing ministries from both countries, with the master planner operated as a JV formed by a Chinese and Singaporean consortium. Partnerships with the function of demonstration also included eight company-led eco-city and low carbon construction projects, where foreign firms and academia participated as designers, planners, or technical advisors. For example, a “neofuturistic” skyscraper in Guangzhou was designed by two foreign architect firms to be the most energy efficient super-tall building in the world.

Rule-setting

Seven partnerships in the sample had a rule-setting function, all of which were led by municipal authorities. These partnerships involved formulation of emission reduction targets and low carbon transport plans, in which municipal authorities created obtained planning advice from foreign organizations, academia, and higher-level government institutes. For example, authorities in Qingdao developed an urban emission reduction plan in collaboration with the Asian Development Bank (ADB) and the World Resources Institute (WRI). The ADB and WRI drew together an international research team that produced an inventory of the city’s energy use and a technology roadmap to emission reductions, also reported to have improved cross-sector coordination and public participation. Another example is the Guangzhou Sustainable Transport Plan, developed by Guangzhou Municipality and

¹ The correlation between “initiatives led by municipal authorities” and “land-use sector” has a Chi-Square coefficient of 4.7, with $df = 1$. This is above the critical value of 3.84 for a statistical significance of 0.05.

² The correlation between “initiatives led by companies” and “waste sector” has a Chi-Square coefficient of 14, with $df = 1$. This is above the critical value of 7.9 for a statistical significance of 0.005.

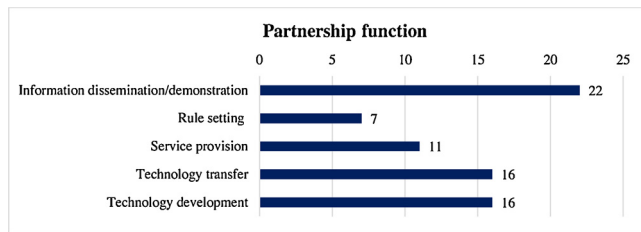


Fig. 2. Governance function of partnerships in the selected sample.

the international non-profit organization Institute for Transportation and Development Policy (ITDP). The plan exhibits an integrated BRT system, railway system, and a large bike-sharing system, which is cited to contribute to emission reductions while being socially inclusive.

Technology development and technology transfers

As shown in Fig. 2, the second most common functions of partnerships in this sample were technology transfers (16 initiatives) and technology development (16 initiatives). In technology transfer initiatives, Chinese companies formed linkages with foreign firms to import equipment for wind plants, waste-to-energy plants, co-generation facilities, district heating and cooling technology, and industrial energy efficiency upgrades. In some cases, foreign companies were actively involved in applying new technology and providing on-site training. Five infrastructure projects also received technical advice and funding from international organizations in connection with technology transfers. These were provided by the Asia Development Bank (ADB) (for a low carbon district in Qingdao) and through the CDM mechanism (four three waste-to-energy projects and an MRT system in Guiyang).

The sample included three forms of technology development partnerships: joint innovation platforms, collaborative research projects, and provision of research funding. An example of the former was an industrial park for recycling technology in the city of Qingdao, set up by an SOE and multiple academic institutes. An example of a collaborative research project was development of CCS technology in Chongqing, led by a Chinese SOE in cooperation with local academic institutes. Three partnerships were formed to mobilize funding for technology development. An example was a PE fund for energy saving for local firms set up by Wuxi Municipality, with the Agricultural Bank of China and Guolian Finance Group acting as strategic investors.

Service provision

Eleven partnerships had the function of service or infrastructure provision. This included contractual arrangements (PPPs, JVs, and BOTs) between municipal authorities and firms, and partnerships for funding mobilization. For example, municipal authorities in Kunming, Baoding and Xiamen formed PPPs with SOEs in the provision of two solar plants and a solar-powered BRT station. Another example was a district heating and cooling scheme in Chongqing, which was a BOT scheme launched by a foreign company and financed by a loan from the International Finance Corporation (IFC). An example of a resource mobilizing partnership was the project “Shenzhen New Vehicle,” in which Shenzhen Municipality introduced a financial leasing model to purchase electric buses with Potevio Group standing as loan guarantor. Shenzhen Municipality reached a similar financing agreement with Southern Power Group in the installation of EV charging stations. There were also partnerships between municipal authorities and academic institutes to design infrastructure projects. An example was a “low carbon transport hub” in Shanghai, where Shanghai Urban Construction Design Institute were in charge of layout and design.

5.3. Introduction of technology and policy

Our selection of initiatives suggests that partnerships with foreign organization favor introduction of new solutions into local climate

projects.³ In-depth study of these initiatives and review of interview data revealed three mechanisms through which partnerships with foreign actors (and to a more limited extent academic organizations) facilitated introduction of new policy and technology.

The first mechanism emerged in partnerships with the function of demonstration. Several large-scale projects involved sharing ideas between heterogeneous organizations, apparently allowing for experimentation with new strategies. In this sample, most policy or planning approaches that were self-reported as “new” occurred in such large-scale, multi-stakeholder demonstration projects. Examples include new energy efficiency building standards in Tianjin SSTE, ecological infrastructure and networks of wetlands in Guangming Low Carbon District in Shenzhen, low carbon zoning codes in the Changxindian Low Carbon Community in Beijing, and man-made wetlands for cleanup of polluted river water in Pingdi International Low Carbon District in Shenzhen. A foreign consultant explained that developers and design firms often replicate new sustainability solutions absorbed through participation in such projects, creating some potential for further diffusion (Interview with international consultancy firm, 2016.06.13, Beijing).

Second, new policy practices were introduced in rule-setting initiatives where municipal authorities sought external advice. For example, through Wuxi’s engagement in the Low Carbon Future Cities, local authorities and the German Wuppertal Institute created a dialogue between stakeholders in Wuxi and representatives of the city of Dusseldorf. This dialogue resulted in an online information system used to estimate the capacity of renewable energy development, which supported formulation of an urban emission reduction plan. Another example is Guangzhou E-core, a new planning strategy introduced to protect ecological areas in the Guangzhou Municipality formulated in collaboration between Guangzhou Urban Planning Bureau and Tongji University in Shanghai. The design relies on a greenway convergence logic that connects green areas, supports species diversification and limits use in elevated highways.

Third, research partnerships may introduce new emissions reduction technologies. Interviews with firms in the paper and steel industries confirm that importing new technology helped reduce emissions over the past decade. However, imports are becoming less crucial as the sophistication of domestic equipment is catching up with Western competitors, in parallel with China shifting from an importer to a global leader in renewable technology (IEEFA, 2017). Several interviews highlighted partnerships between companies, academia, and foreign organizations as key to technology development (Interview with Iron and Steel Industry Alliance, 2016.03.04, Shandong; Interview with paper industry alliance, 2016.05.22, Beijing; Interview with paper company, Shandong; 2016.06.13, Interview with paper group, 2016.06.18, Beijing). For example, a paper and pulp firm conducted research on energy conservation and environmental protection through partnerships with China Paper Research Institute, CAS, Beijing Forestry University, foreign companies and foreign universities (Interview with paper company, 2016.06.13, Shandong). This collaboration was seen as crucial for securing global leadership in clean technology.

5.4. Deliberation and skewed participation

While partnerships in this sample displayed a diversity of actor constellations, we found that some organizations were excluded from collaborative climate mitigation efforts. In our selection, there were no organizations representing social agendas. While universities and semi-governmental research institutes were involved in multiple projects, these organizations participated as technical advisors rather than as

³ The correlation test between “introduction of policy or technology” and “partnership with foreign/international organization” had a Chi-Square coefficient of 12.15, with df = 2. This is above the critical value of 10.6 for a statistical significance of 0.005.

advocators of social concerns. The only initiative led by an NGO had a technical character (design of a BRT system in Guangzhou). Local communities or grassroots movements did not lead any initiatives, and no partnerships included social justice dimensions of sustainability.

The second indication of this trend was the dominance of actors that represent technical skill or economic resources. This trend has different explanations for partnerships with different functions. Partnerships for technology development creates links between domestic and foreign firms and research institutes. Since the objective is to develop technology, these networks primarily include actors that represent technical skills and knowledge. The image that emerges is one of close-knit networks interconnected with global flows of information, with actors involved in multiple, parallel collaboration projects.

In rule-setting partnerships, there appeared to be somewhat more room for deliberation and exploration of new ideas. As mentioned above, the database contained seven examples of local authorities inviting foreign organizations and research institutes to provide new perspectives in policy making processes. While some cases involved references to social inclusion and public participation, information collected through our interviews suggest that municipal authorities favor policy collaboration with organizations with a “scientific” or “technical” profile. A policy advisor explained that when creating sustainability and spatial plans, planning bureaus regularly “delegate the actual planning to experts” (Interview with university professor, 2013.04.19, Beijing). A policy maker confirms that experts often have a strong influence over local planning processes and that China’s heavy emphasis on “scientific policy-making” encourages decision makers to seek technical advice (Interview with policy maker, 2013-03-08, Beijing). This tendency to favor technical policy input is likely to limit the potential for decision making collaboration to open up for a broad range of social interests.

In demonstration partnerships, the evidence regarding deliberation was mixed. There were examples of new participatory approaches introduced through collaboration, such as “participatory simulation” to integrate views of stakeholders in the Sino-Swedish Low Carbon Eco-City in Wuxi. On the other hand, most partners were invited to these partnerships to provide technical advice (research institutes and architect firms), funding (developers), or a combination of both (development banks). Further, the emphasis in low-carbon cities and districts was on technical rather than social innovation (Interview with policy advisor, 2013-04-18, Beijing; Interview with foreign consultancy firm, 2016.06.13, Beijing). Actors involved in drafting master plans for the eco-cities in Tianjin and Wuxi explained that local authorities and companies primarily were driven primarily by pursuit of technology development and profit generation (Interview with foreign consultant, 2013-05-24, Beijing; Interview with consultant, 2013.05.27, Beijing). A respondent described the rationale behind the Tianjin eco-city as follows:

One motive for them was to have a chance to use many new forms of technology, such as water technology, city district layout, and so forth. However, they were also interested in getting some form of economic profit from this. They wanted to sell real estate in the eco-city, so they wanted to increase the planning of the real estate area (Interview with foreign consultant, 2013-05-24, Beijing)

The failure of ambitious sustainability projects in China to open up for social inclusion has been observed in previous research. For example, Caprotti (2014) describes Chinese eco-cities as void of social considerations, politically disengaged and catering to particularistic investment interests.

In our sample of initiatives, the heavy emphasis on investment- and technology-driven development was most visible in company-led partnerships with the purpose of infrastructure delivery or demonstration, where we found no evidence of enhanced room for social involvement or deliberation. The sample included multiple business-operated projects described as “low carbon,” which exhibited only a couple of

resource-saving technologies (such as energy efficient elevators) or aimed to deliver luxury real estate developments. When questioned about the role of companies in low-carbon projects, a planner observed that their key motivation is access to market opportunities (Interview with research institute, 2016.05.02, Beijing). A consultant described the participation of developers in low-carbon projects as follows:

If they follow our planning and “go green” they are likely to be able to get access to land more cheaply. So, they pay for the planning, and then they take the plan to the local government and “say this is green”! And this may get them the land ... Developers in China are very practical. They mainly just want the solutions that save money. If we give them 24 criteria they will just take the one that are economically beneficial and forget the rest (Interview with international consultancy firm, 2016.06.13, Beijing)

Owens and Cowell (2011) argue that a fundamental role of planning is to allow for scrutiny and critique, in which social and environmental objectives are taken into meaningful account. Such questioning works particularly poorly in the promotion of glamorous initiatives such as eco-towns, where sustainability tags instead are used to legitimize investment decisions. In China, we similarly observe that company-led partnerships formed with an overarching purpose of profit generation are unlikely to contribute to greater social inclusion and may be poorly aligned with broad socio-environmental priorities.

6. Discussion and conclusion

This study shows that partnerships do emerge in this top-down political context and that these arrangements play an important role in climate change governance by facilitating multilevel interactions, horizontal collaboration and (some degree of) experimentation with new ideas. The study extends beyond well-known megacities to reveal trends in smaller urban areas and cities in locations other than China’s East coast. The analysis shows that partnerships are a standard means of governance in cities with a robust climate mitigation discourse in China. However, further scholarly attention is required to understand dynamics in less-known secondary cities, rural areas and geographically peripheral locations (the far West, North, and South of China), which remain largely unknown.

Based on the results of this research, can we explain the rise of partnerships in this (semi-)authoritarian political system? This study demonstrates how cross-sector connections facilitate the search for low carbon development solutions at the local level. As a collaborative advantage, partnerships create opportunities for actors to access resources and capacities that they do not have on their own (Glasbergen et al., 2007). Thus, partnerships allow actors to overcome barriers to action, such as limited knowledge, technical capacity, or economic resources. We understand partnerships in this context to represent a pragmatic attempt to deal with a practical problem, realized by efforts to access resources, best practice, and the global circulation of policies and technologies. In this political context, partnerships produce the additional opportunity to find alternative means to govern climate change beyond top-down, state-led forms of governance. This is achieved through modest experimentation with new solutions and controlled introduction of new ideas into climate plans and projects. The diversity of collaborative arrangements identified by this study also suggests that climate policy diffusion is realized through a greater heterogeneity of channels than previously known (cf. Schroeder, 2008; Mai and Francesch-Huidobro, 2015).

Does the existence of partnerships contribute to our knowledge about political change in China? One interpretation is that the emergence of collaborative policy arrangements is part of China’s transition towards a “modern environmental state” (Carter & Mol, 2013). From this perspective, diversification of actors involved in local project and governance is slowly creating processes and institutions that are increasingly similar to those in the “West”. However, taking a step back

and reflecting on the evolution of political institutions in China cautions against this interpretation. Through in-depth study of decentralization experiences in China, Chung (2000) concludes that devolution of authority from central to local government occurs very slowly. During agricultural decollectivization, most local authorities chose not to use their newly granted autonomy, due to a long-ingrained history of centralized rule and fear of acting out of line. Chung (2016) has also studied decentralization by evaluating seven mechanisms of central control used in historical and modern times. Various control mechanisms have stayed surprisingly intact over centuries of rule, and many have been stepped up in recent years. This historical perspective suggests that while political rhetoric changes (for example through discourses of liberalization, privatization and modernization), underlying structures of power remain remarkably unchanged. In the context of partnerships for climate change, our research suggests that the current system of governance allows limited and controlled experimentation with new ideas in a system that overall stays the same. The rise of partnerships is unlikely to be akin to a development towards deliberative, bottom-up approaches to climate change policy. Skewed trends in participation further suggest that collaborative arrangements favor actors representing economic and technological capacity – notably large domestic firms, research centres, international development banks, and foreign companies. Rather than heralding the democratization of environmental governance, climate partnerships may reproduce existing political practices and entrench existing structures of power.

Nevertheless, the inclusion of foreign actors in China's climate policy domain is not without relevance. The central government has opened up for foreign participation in demonstration projects, investment into infrastructure, technology development and technical aspects of low carbon planning. It is possible that climate change itself, as a particularly pressing global challenge, creates the need for collaboration. China is in a similar way opening up for foreign investment and collaboration in other policy domains that present urgent challenges and are perceived by the government as “non-threatening”, such as elderly care (Reuters, 2016; Suokas, 2016). Climate change is a powerful political discourse that can produce collaborative responses even in contexts least likely to open up to cooperation. These collaborative responses, however, are far from integrating broader societal concerns and political change that would enable a transformation for sustainability.

Declaration of conflicting interests

The authors declare that there is no conflict of interest.

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